There's Triple Vessel Disease and Triple Vessel Disease: Risk Assessment

Editor's Note: Please see the program for the angiography films referred to below.

There's Triple Vessel Disease and Triple Vessel Disease: Risk Assessment

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Adrian Banning, MD: Hello, I'm Dr. Adrian Banning and I'm a Consultant Cardiologist in the Department of Cardiology at the John Radcliffe Hospital in Oxford. It's my pleasure today to welcome you to our panel discussion, and our topic of discussion is, "There's Triple Vessel Disease and Triple Vessel Disease: Risk Assessment."

I am joined today by Jonathan Hill, who is a Consultant Cardiologist at King's College Hospital in London. Welcome, Jonathan.
So what we're going to do today is we are going to look at the case from the SYNTAX [Synergy between PCI with Taxus and Cardiac Surgery] trial. As you know, the SYNTAX trial was a trial of patients with 3-vessel disease or left main disease, and it was a randomized trial comparing either angioplasty with stents, the TAXUS Express stent, or bypass surgery. In this case study is an actual patient from the randomized trial and we are going to look at the procedure that was undertaken, and then perhaps discuss some of the implications of the data that we got from SYNTAX and try and apply it to both this patient and perhaps other patients that we all look after.
This particular patient is a 64-year-old male. He's known to have a raised cholesterol level and he's an ex-smoker. He's 112 kg, not diabetic, and he presented with exertional angina of 2-months duration and an exercise test which was positive at a low workload. His maintenance medications are aspirin, atenolol, ramipril, simvastatin, and isosorbide dinitrate. This angiogram shows the left coronary artery. As you can see there's a severe proximal stenosis in the LAD [left anterior descending artery], a subtotal occlusion of the circumflex. If you look at the right-hand panel, you can see there is a further stenosis in the mid LAD. The distal vessel is good. The right coronary artery in the right panel has quite diffuse disease over a long segment. It's a dominant vessel and there's an angulation in the midvessel. As you can see left ventricular function is good.

So during the SYNTAX trial, all the patients with 3-vessel disease and/or left main disease were discussed by the heart team. And the principle of the heart team was that the interventionalist and the heart surgeon would both agree whether the patient could be equivalently revascularized. So in this case, both the cardiac surgeon and the interventionalist agreed that we could treat this patient, we believed completely, and provide complete revascularization.
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As part of the heart team process, we undertake the construction of the SYNTAX score. This SYNTAX score is available on the Website and is now usable for all our patients at www.syntaxscore.com.

This particular patient, in summary, has severe proximal and mid-LAD disease, subtotal occlusion of the circumflex artery and a long segment of severe disease of the right coronary artery. This calculates out to a SYNTAX score of 25, placing the patient in the mid-tertile.
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- Multivessel disease including prox LAD
- CABG vs PCI
- Enrolled in SYNTAX trial
- Randomized to PCI

As I have mentioned, the patient was randomized to angioplasty and this is the procedure.

PCI Strategy

- Complete revascularization in one procedure
- Which vessel first?
- Intra-aortic balloon pump?
Ideally, in the SYNTAX trial we were asked to provide complete revascularization in 1 sitting. And, clearly, one has to make a choice as to which vessel to start with. There was also a question about whether you place a balloon pump in a patient where you are intending to place a large amount of coronary stents.

**RCA**

- Predilate
- **Taxus 3.0 x 24 to mid/distal RCA**
- **Taxus 3.0 x 28 to mid RCA**
- **Taxus 3.5 x 20 to prox RCA**
- Postdilate throughout with 3.5 & 4.0 NC balloons

In this particular case, at presentation the patient was quite hypotensive on arrival in the lab. As a consequence, a balloon pump was placed at the initiation of the intervention. I chose to undertake the right coronary first, and the Judkins right guide catheter was placed, along with a BMW (balance middle weight) wire. Extensive pre-inflation was undertaken, followed by the placement of a Taxus 3 x 24 Express stent in the mid and distal right coronary. I then placed a 3 x 28 in the midvessel more proximally and a 3.5 x 20 in the proximal right coronary.

Although it's tempting to leave it like that, it's very, very important to ensure particularly in long segments of stented vessel, at least stents that are optimally expanded, and so we subsequently went on to post-dilate throughout that stented segment initially with a 3.5 and subsequently with a 4.0 minimally compliant balloon. As you can see, the angiographic result was also good. We then turned our attention to the left coronary.

You'll remember that the circumflex vessel is subtotally occluded. I think if the circumflex was completely occluded, then I would have done it first, but I was confident that we could cross that circumflex stenosis and as a consequence I chose it to be the second vessel.
We crossed that vessel with a BMW wire that was predilated and stented after progressive predilatation. A 3.5 x 24 Taxus Express stent was placed with a good angiographic result.
We then turned our attention to the LAD. Once again, the BMW wire was used to wire the lesion, and we stented the proximal stenosis after predilatation with a 3.5 x 16 stent.

As you can see on this lateral view, there was some evidence of an exit dissection straddling a moderate-sized diagonal. We elected to stent that with a further Taxus Express stent 3 x 12 achieving a good angiographic result without compromise to the diagonal. As you can see in its lateral view, the more distal LAD stenosis is now evident, and we went on to stent that directly with a 3 x 12 Taxus stent. The angiographic result was very satisfying. This is the final result that we achieved, in the left coronary in the left panel, and the right coronary on the right.
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So in summary, we placed 7 stents, with a total stent length of 136 mm. This case took 1 hour and 20 minutes, with a screening time of 15 minutes, and the contrast load of 500 mL. This patient has been followed up as part of the SYNTAX trial; the SYNTAX trial follow-up is envisioned to be 5 years, and at 3-years follow-up this patient is well and asymptomatic.

**Jonathan Hill, MD:** That's a great case, Adrian. It illustrates the challenge that SYNTAX presented us with and that is what to do with the patients in this intermediate zone because are we all agreed that the low-risk patients with low-risk lesions, 3 focal stents, will be treated now with PCI? Does SYNTAX empower us to do that?

**Dr. Banning:** I think it probably does. There's still some debate around it and some challenges in the diabetic subset.

**Dr. Hill:** Okay.
Dr. Banning: In nondiabetic patients with discreet 3-vessel disease and a low SYNTAX score, I think the data we have -- which only goes out to 1 year so far -- does show that angioplasty is a reasonable option for that group of patients.

Dr. Hill: And would the surgeons in your heart team agree with that approach?

Dr. Banning: Yes, I think they would. I think it's important that we've all seen pictures, but in that low-tertile group we are now seeing equivalent results with drug-eluting stents as compared with surgery.

Dr. Hill: Okay. So then going to the high-tertile group, when everyone groans when the angiogram comes up, and with a high SYNTAX score, what's the approach now in your center?

Dr. Banning: It's important to remember that in SYNTAX, the trial was designed to be an inclusive design so that all the patients were looked at, and as I mentioned at the outset, patients in whom equivalent revascularization was possible were randomized. There was a large group of patients in whom it was felt that 1 actual surgical technique was better than the other, and those patients were put into the registry. So there are 1800 patients in the randomized trial, about 1000 patients in which surgery was the only option, and about 200 patients in which angioplasty was thought to be the best option. If you look across the spectrum of that disease where you've got 3-vessel disease and left main disease, which we accept is the severe end, even within that there is a range. Most of those patients will be
surgical; however, I think there's a group of patients where the SYNTAX score is high, where the EuroSCORE [European system for cardiac operative risk evaluation] is also high, where angioplasty may be a better option, and complete revascularization may be possible, and we can reduce surgical morbidity and mortality by treating what we believe to be the culprit lesion. The results of the angioplasty registry are very encouraging in SYNTAX. And so I don't think necessarily that angioplasty should not be applied in the sickest patients, and in fact in the real world as you know, there are an awful lot of sick patients that benefit very quickly and very dramatically.

**Dr. Hill:** So, in a way, what you're saying is that the interventionalists have been empowered in a certain population; it has reinforced the opinions of the surgeons in what we would see as a traditionally surgical population, but there is still some conflict over this middle ground. I think this case illustrates that exactly, so that with a SYNTAX score here of 25 on an individual lesion by lesion basis you wouldn't hesitate to treat them.

**Dr. Banning:** Right.

**Dr. Hill:** But what were the factors in this particular case? Would it be the length of stent that you would be using, would it be the subtotal occluded vessel? What were the factors here that would have swayed you one way or the other?

**Dr. Banning:** I think one of the other things this illustrates is that SYNTAX wasn't really representing our standard practice.

**Dr. Hill:** No.

**Dr. Banning:** I don't think I would normally set out to treat all 3 vessels in this patient in 1 sitting. This trial recruited from 2005 and closed in 2007, so it's only 3 or 4 years ago that this chap was treated. If you are going to give appropriate consent to this patient, and you feel it's likely that you are not going to completely revascularize him in 1 sitting, you have to have that as part of the consent process. The second part of the consent process is the fact that there will be a likelihood of increased, complete revascularization with angioplasty so that at the 1 year, 2 years, there is a slightly higher chance in this intermediate group that repeat revascularization may be necessary. That's balanced against the risk like stroke and surgical complications. So it is a complex consent process.

One of the benefits of the SYNTAX score is it makes you look at every lesion quite carefully, and one of the differences in the SYNTAX trial compared with our usual practice was that you were taking on quite complex lesions as part of a multivessel approach at 1 sitting. I don't think we would normally do that.

**Dr. Hill:** No.

**Dr. Banning:** We would tend to do perhaps what we think to be the most difficult lesion first,
and then we'd probably stop. Patients have enough, 300 mL of contrast and come back to it another day. So there are differences in the SYNTAX trial performance compared with what we have perceived to be our normal practice. That difference isn't evident in surgical practice. An operation for surgeons is an operation.

Dr. Hill: So what would happen now if this patient came to your clinic with that history and this angiogram?

Dr. Banning: In the elective setting, it's reasonably straightforward. We would discuss it at MDT [multidisciplinary team] and as long as the MDT came to a consensus, then we would follow the consensus. There are patients where consensus can't be reached, and that's problematic, and it's been suggested that the patient should be seen sequentially by an interventionalist and a surgeon. I'm not sure that's the best approach to be honest; under those circumstances, all 3 participants should be present in the room: the interventionalist, the surgeon, and the patient together. I have had experience in situations where patients got conflicting advice from an interventionalist or a surgeon, and that's quite difficult for patients to handle. Often these patients are quite elderly, and to receive 1 set of advice from 1 doctor and another set of advice from another doctor, which are completely different, is very difficult for them to handle. Who do they trust, who do they believe? We have to try and avoid that.

Dr. Hill: Well, I think what's happened is we have created a new problem of the doctor/patient relationship and preservation of the confidence in your physician that we've slightly eroded so that you are saying, "Well, I can do this and actually I have to go and check for somebody else whether they agree that I can do this."

Dr. Banning: One of the things I don't like is an inference that interventionalists would almost woefully do something which is not in the patient's interest. I don't believe that that is likely to happen.

Dr. Hill: Do you not think that's a feeling that permeates cardiac surgery generally in the United Kingdom? Is that an unfair thing?

Dr. Banning: I think it is unfair personally. I don't think patients, I don't think anybody would do anything deliberately which they think is suboptimal. Occasionally, one of the challenges that interventionalists have is, over the last 5 years in particular, an increasing amount of ACS [acute coronary syndrome] work. So there's an awful lot of unstable angina, and there's an awful lot of primary angioplasty. Those patients need to be revascularized quickly, and in many centers, urgent, meaning within the next 24 to 48 hours, surgery just isn't available. As an interventionalist, we know that if we treat that culprit lesion then we'll sort the patient out; the patient will be able to go home. You then convert a patient in 3-vessel disease who might have been a surgical candidate to 2-vessel disease where surgery seems somewhat less attractive, particularly given the issues of what do we do with the vessel that's treated? Do we put a drug-eluting stent into a culprit infarct vessel? It looks great at 3 months. If we approach the surgeons and say, "Are you going to put a graft on or not?" If we are going to improve our

This is a transcript of an online program, which may be found at: http://www.theheart.org/article/978749.do
decision-making process, I would like to see the surgeons coming into the lab and telling me, "Yes, we can do that. But it needs to be done now, and I mean now by 24 to 48 hours." I don't believe that there is any advantage in sitting on a patient.

**Dr. Hill:** Cooling them down.

**Dr. Banning:** Well, they don't cool down, do they? They leak troponin, that means they're leaking myocardium. Myocardium is dying sequentially, and they eventually get done at 10 days when the aspirin and clopidogrel has been stopped. I don't understand that paradigm, quite honestly. If there's a benefit from early revascularization relief of ischemia with angioplasty, why should the paradigm be any different in surgery? You know, there's an anxiety. I don't see any patient has ever benefited with severe unstable angina from a carotid Doppler. All it does is it adds to the surgical risk assessment that they put into their algorithm.

**Dr. Hill:** If you put yourself in the position of the patient now knowing that actually you can be fixed percutaneously, you know perhaps a radial procedure where you will be walking out a few hours later, do you not think that that's accepting the risk for a repeat revascularization which is a pretty good price to pay for a reduced risk for stroke? Would you think that the surgeons appropriately consent for the risk for stroke?

**Dr. Banning:** It obviously varies within practices and varies within individuals. I know in the United States, a large number of the consent forms are extremely comprehensive, and there is a point at which very comprehensive information provides no information. Interestingly within the SYNTAX trial, you can imagine the consent process was extremely complicated. One of the central tenants was you had to say to the patient, "We don't know which treatment is best, and as a consequence we want to put you in this trial." It's quite unusual for us to say to patients we don't know, but ultimately I think if you inform patients and you have the time to spend with patients, you can get over that message.
Conclusions

- Involve family in decision making
- Involve multidisciplinary team to determine optimal procedure
- SYNTAX trial has improved relationships between surgeons and interventionalists

So when we're appropriately informing patients about treatment options, one of the important things is that we are also informing the patient's relatives. It's really valuable to have either the spouse or son or daughter there to help absorb the information. The second important point is that we don't put pressure on them to make the decision there and then in the elective setting. I think if they can go away and absorb it for a little while and then come back to us, that's usually the best option.

The challenges in this acute setting, as I've said, there is a need to revascularize urgently, medically, and financially. Having people sitting around in the hospital bed while they're making their mind up is quite an expensive process, so I do think we need to try to evolve a better process for informed consent in the acute setting.

Dr. Hill: Do you practice this 3 people in the room?

Dr. Banning: Well, the MDT will often work very well, and at the end of the MDT it's quite clear that it's surgical or it's angioplasty, and that's that. As I've said, the 3 people in the room, is best if there is some debate. And my experience with that has usually been when I've not been the initial interventionalist who's been involved. It needs a personal relationship with the surgeon. I honestly believe that there is no point in interventionalists and surgeons fighting. I think one of the great things about SYNTAX is it has brought us back together. One of the great things about TAVI [transcatheter aortic valve implantation] - percutaneous aortic valves, is it's brought us back together.
Dr. Hill: Sure.

Dr. Banning: And, increasingly, really complex, high-risk patients who are referred to my surgical colleagues, they now often come to me and say actually, "The EuroSCORE here is high, the targets are poor, is there anything you can do?" And I did not see that practice 2 or 3 years ago.

Dr. Hill: No.

Dr. Banning: Where we had our patients, they had their patients, and there wasn't this kind of cross-fertilization. I'm sure increased cross-fertilization and discussion in patients is very much in their interest.

Dr. Hill: Well, perhaps that's one of the great benefits of SYNTAX.

Dr. Banning: Yes.

Dr. Hill: Is that it's actually brought the surgical and interventional community together.

Dr. Banning: It has, and there is a recognition. If one of the messages of SYNTAX is that you've got a diabetic in front of you, and they've got an occluded right and a long segment of LAD disease and disease of the circumflex they're better off with surgery, that's really not news to me.

Conclusions

• Both diabetic status and lesion complexity influence relative safety between CABG and PES and should be considered when evaluating treatment options

• SYNTAX score has clarified decision-making processes

• FAME results – FFR may assist in more readily identify areas which require revascularization
Dr. Hill: So if this patient were diabetic, the decision would have been different.

Dr. Banning: To place 136 mm of stent in a diabetic patient, your chances of the need for complete revascularization are really quite high. Based on the SYNTAX data, I would very strongly advise the patient to have surgery.

Dr. Hill: Okay.

Dr. Banning: Whether that distal LAD lesion would interfere with the mammary, we didn't feel so when it was discussed at MDT, so had that pattern of disease been present in a diabetic, I think the current evidence would favor a surgical approach.

Dr. Hill: So the SYNTAX score is then clarified and crystallized our decision-making process.

Dr. Banning: Yes.

Dr. Hill: So another patient who presents with similar angiogram, nondiabetic with a maybe some slightly different lesions, but a SYNTAX score of 25, what's going to happen to them?

Dr. Banning: I think the other issue now is you bring in the FAME [Fractional Flow Reserve vs Angiography for Guiding PCI in Patients With Multivessel Coronary Artery Disease] results. And so FAME will tell us which lesions really need to be treated, and it means that we can treat ischemia more effectively in that we can more readily identify which areas of myocardium are ischemic and need stenting. It means we're not putting in stents which are unnecessary. One of the major differences between the FFR [fractional flow reserve] guided intervention of FAME and non-FFR guided was the reduction in procedural infarction.

So I think applying some of the messages of SYNTAX, but also being cognizant of the messages from FAME, does allow us to evolve our therapy and to select more accurately which patients need to be treated. I don't think it's wrong for us to take a patient who has had an angiogram to the lab for a pressure wire and then say, "Look, we've done the pressure wire, I think you'd be better off with surgery." Or if we do a lesion where the FFR is not positive, to go ahead and treat. It needs a bit more consent in the pre-procedure phase, but I think you know that's an entirely reasonable strategy and an evidence-based strategy.

Dr. Hill: I think all surgeons are now very interested in the pressure wire results. I think it's helping them guide their surgical intervention.

Dr. Banning: Well, it's been a very informative discussion, Jonathan. Thank you very much indeed. That concludes this Webcast.